

CLAIMS

What is claimed is:

1. An apparatus comprising:

a guiding enclosure to guide and keep energy from an energy source within the guiding enclosure, the guiding enclosure made of a material reflective of the energy from the energy source, the energy source being either one of a microwave source and an infrared source;

a supporting piece detachably coupled with the guiding enclosure, the supporting piece made of a material transparent to the energy from the energy source; and

an absorbing piece coupled to and supported by the supporting piece within the guiding enclosure, the absorbing piece made of at least one material that absorbs the energy from the energy source and transfers the energy to an object to be heated, a predetermined composition of the absorbing piece controlling an energy absorption rate of the absorbing piece.

2. The apparatus of claim 1 wherein the predetermined composition of the absorbing piece includes the absorbing piece made of one material that uniformly absorbs the energy from the energy source.

3. The apparatus of claim 1 wherein the predetermined composition of the absorbing piece includes more than one material, each material capable of absorbing the energy from the energy source at a different absorption rate.

4. The apparatus of claim 1 wherein the energy source is the microwave source.
5. The apparatus of claim 4 wherein the guiding enclosure material is made of metal.
6. The apparatus of claim 4 wherein the supporting piece material is selected from the group consisting of microwave transparent ceramic and quartz.
7. The apparatus of claim 4 wherein the absorbing piece material is selected from the group consisting of silicon, carbon doped metal, and microwave absorbing ceramics.
8. The apparatus of claim 1 wherein the energy source is the infrared source.
9. The apparatus of claim 8 wherein the supporting piece material is selected from the group consisting of quartz, potassium bromide, and infrared transparent glass.
10. The apparatus of claim 1 further comprising a holder with a top portion contacting a bottom portion of the guiding enclosure to keep the energy from the energy source within the guiding enclosure.
11. The apparatus of claim 1 wherein the object to be heated includes a plurality of solder joints sandwiched between a substrate and a chip.

12. The apparatus of claim 11 wherein the object to be heated further includes an underfill material surrounding the solder joints, the solder joints reflowing from the energy before the underfill material is cured by the energy.

13. The apparatus of claim 12 wherein the object to be heated further includes a material sandwiched between the chip and a heat sink on a side of the chip opposite of a side of the chip facing the substrate.

14. The apparatus of claim 13 wherein the object to be heated further includes a heat sink sealant material sandwiched between the heat sink and the substrate at two contact points where the heat sink contacts the substrate, the material cured by the energy before the heat sink sealant material gels from the energy.

15. The apparatus of claim 14 wherein the object to be heated further includes a material sandwiched between the heat sink and a chip.

16. An apparatus comprising:

a guide having an internal cavity, an end through which energy from one of a microwave source and an infrared source can enter the cavity , and a mouth on a side of the cavity opposing the end, the guide being made of a material reflective to the energy so that a majority of the energy is guided to the mouth;

a support piece secured over the mouth and being made of a material through which a first portion of the energy transmits; and

an absorbing piece being made of at least one material which absorbs a second portion of the energy through a first surface thereof facing into the cavity to cause heating thereof, the heat being transferred from a second surface thereof against which an object to be heated can be located.

17. The apparatus of claim 16 wherein the absorbing piece has a predetermined composition that includes one material that uniformly absorbs the energy.

18. The apparatus of claim 16 wherein the absorbing piece has a predetermined composition that includes more than one material, each material capable of absorbing the energy at a different absorption rate.

19. The apparatus of claim 16 wherein the energy is from the microwave source.

20. The apparatus of claim 16 wherein the energy is from the infrared source.

21. A method comprising:

positioning an object for heating within a chamber having an energy source such that the object is in alignment with an absorbing piece secured by a supporting piece, the supporting piece made of a material transparent to the energy from the energy source;

guiding and confining one of a microwave energy and an infrared energy from the energy source within a guiding enclosure inside the chamber so that all of the energy is guided at the absorbing piece and the object, the guiding enclosure made of a material reflective of the energy from the energy source; and

transferring the energy from the absorbing piece to the object by having the absorbing piece be made of at least one material that absorbs the energy from the energy source for transfer to the object, a predetermined composition of the absorbing piece controlling an energy absorption rate of the absorbing piece.

22. The method of claim 21 wherein the predetermined composition of the absorbing piece includes the absorbing piece made of one material that uniformly absorbs the energy from the energy source.

23. The method of claim 21 wherein the predetermined composition of the absorbing piece includes more than one material, each material capable of absorbing the energy from the energy source at a different absorption rate.

24. The method of claim 21 wherein the energy source is the microwave source.

25. The method of claim 26 wherein the energy source is the infrared source.